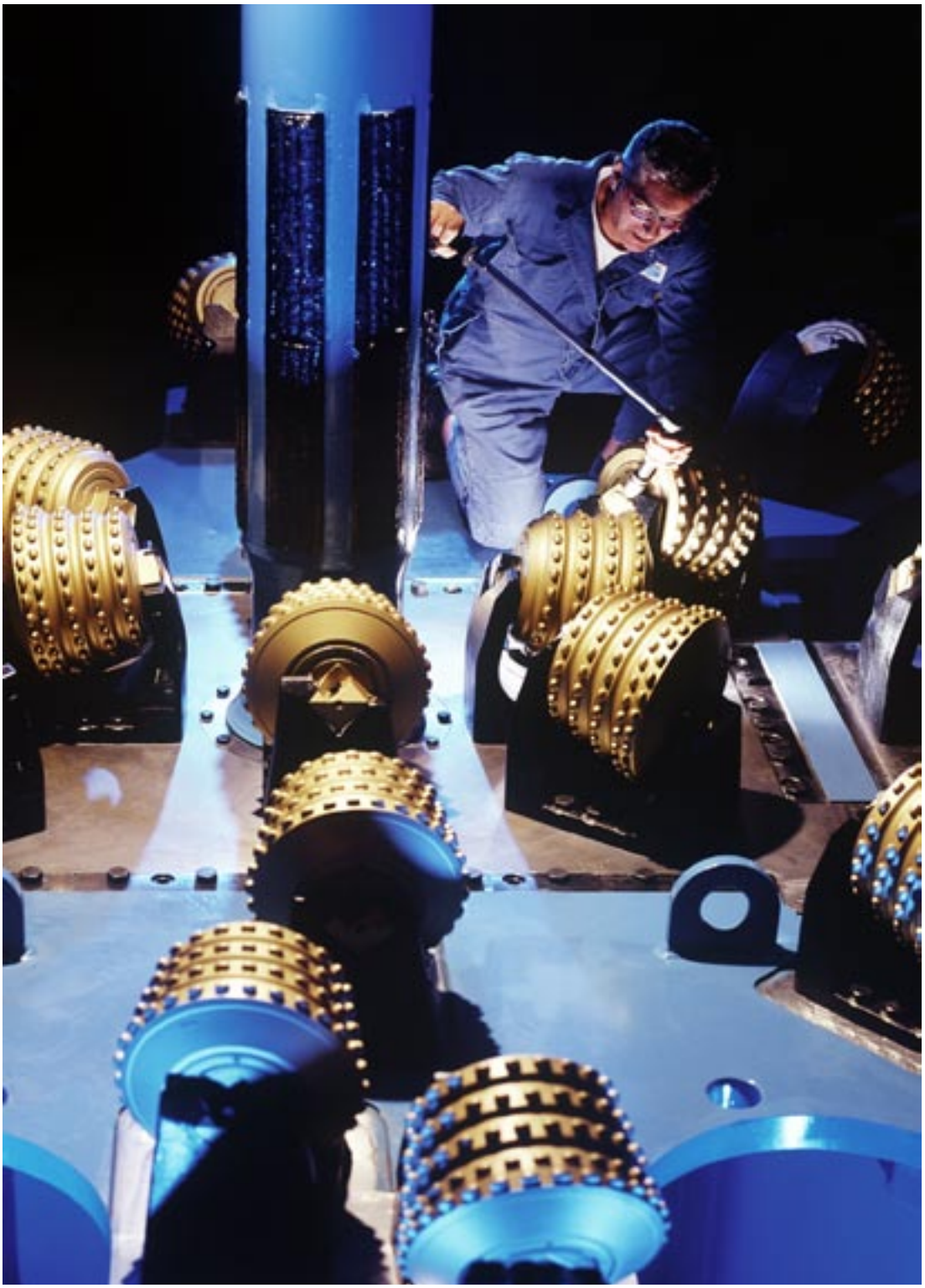
ROCK DRILLING TOOLS

Raise Boring Heads



User manual

SANDVIK

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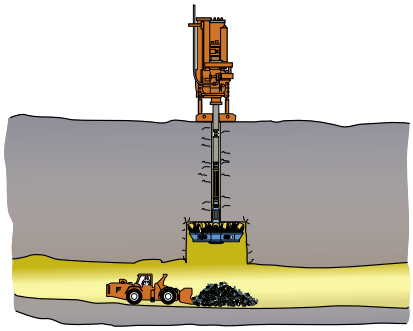
Raise boring methods

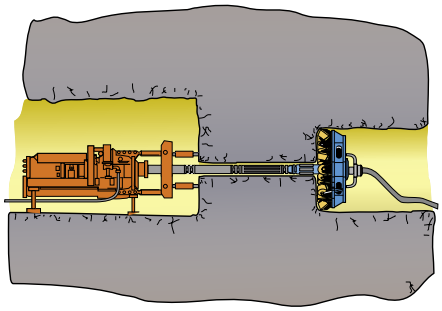
Raise boring

- Access on two rock faces.
- Ø 0.6 – 6 m range.
- Used for ore passes, ventilation raises, penstocks etc.
- Drill pipes under tension.



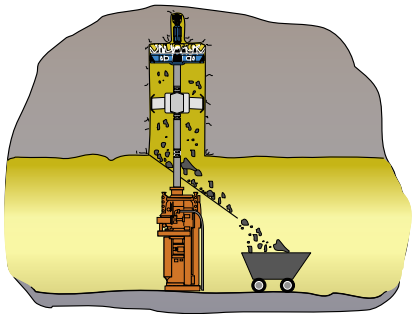
Horisontal boring

- Access on two rock faces.
- Ø 0.6 – 4.5 m range.
- Used in civil construction in urban areas ex. cable tunnel, escape tunnels, sewage tunnels etc.
- Rock stability important.
- Drill pipes under tension.



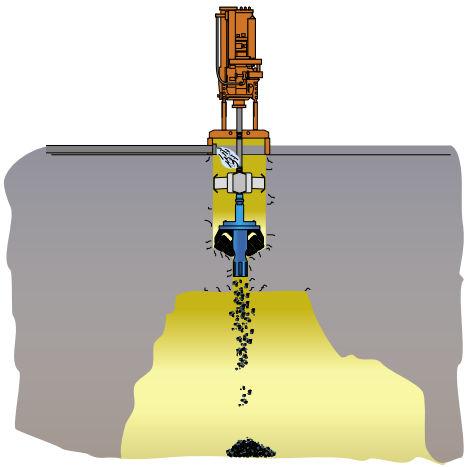
Blind boring

- Access on one rock face.
- Ø 0.6 – 1.8 m range.
- Used for slot raises, ore passes, manways.
- Drill pipes under compression.
- Needs drill pipe stabilisation.



Down boring with pre-drilled pilot hole

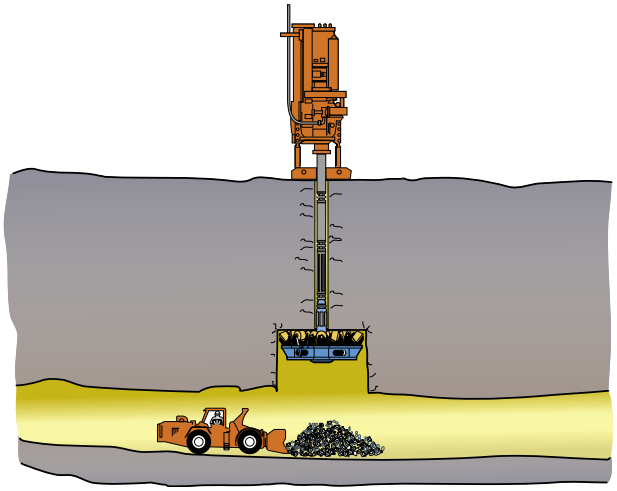
- Access on one rock face and an opening below.
- Ø 0.6 – 1.8 m range.
- Used for drilling large fill holes.
- Drill pipes under compression.
- Needs drill pipe stabilisation.



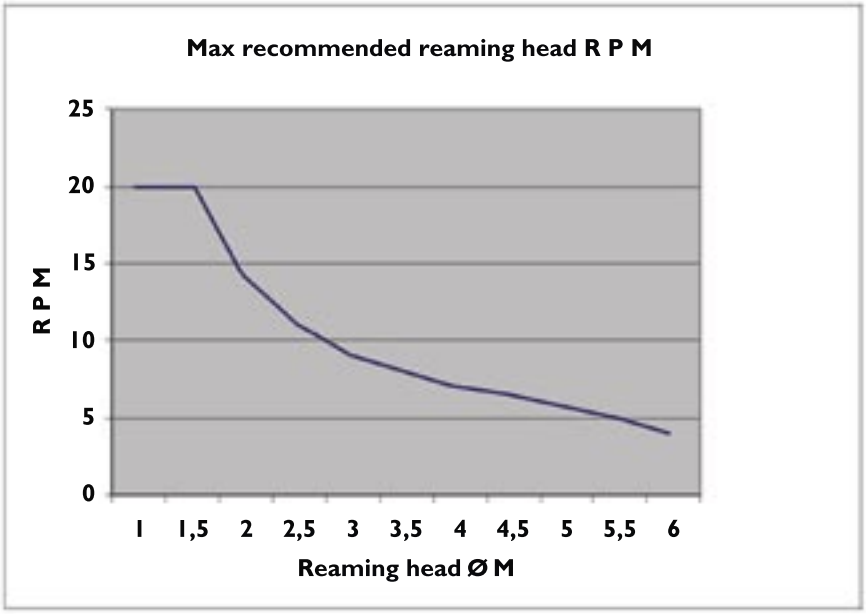
General recommended reaming parameters

Max recommended operating cutter load.....27 tonnes (60 000 Lbs)
Max recommended reaming head speed.....see graph below

The net operating cutter load is chosen depending on machine/ drill pipe capacity and rock characteristics.
Increase the cutter load ≤ max cutter load and/or the machine/ drill pipe capacity limit as long as increased load results in increased rate of penetration.
The reaming head speed (RPM) is chosen depending on reaming head diameter and rock characteristics.
Utilise the optimum (fastest) RPM the rock formation allows ≤ max recommended reaming head speed together with optimum net cutter load.
Reduce the RPM before reducing the cutter load.



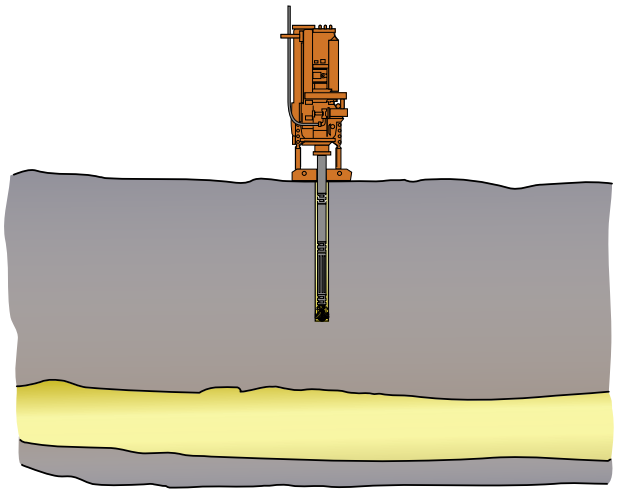
Cutter maintenance
The raise boring cutter bearings are operating under extreme conditions, exposed to constant high operating loads, varying degree of uncontrolled shock loads in combination with high temperatures.
It is of vital importance to use the recommended type of lubricant suitable for these conditions and to relubricate the cutters on a regular basis in order to obtain an optimum cutter service life.
The interval between re-greasing needs to be more frequent with increased temperature as the lubricant properties are affected by increased operating temperatures.
See page 33 for the re-greasing instruction.



General recommended pilot drilling parameters

Max recommended operating bit load.....3 tonnes (6 600 Lbs) x bit diameter in inches
Max recommended speed .....60 RPM

The net bit load and drilling speed (RPM) is chosen depending on rock characteristics ≤ max recommended bit load and RPM.
Utilise the highest RPM the rock formation and the machine allows ≤ max recommended bit RPM together with the correct bit load for optimum rate of penetration and bit service life.
Reduce the RPM before reducing the bit load.
For optimum performance use sufficient flushing to clean the hole and avoid regrinding of cuttings. Use min 800 litres/min of water for efficient flushing.



General information for Sandvik pilot bits

Part no	Bit type	Diameter		Weight		Pin connection	Max. rec. bit load		Rec. drilling speed
		mm	inch	Kg	Lbs	API reg	Kg	Lbs	RPM
7006-7229-25XXX	SCMH	229	9	45	100	Ø 4 1/2"	27 000	59 470	30–60
7006-7251-25XXX	SCMH	251	9 7/8	62	137	Ø 6 5/8"	29 600	65 200	30–60
7006-7279-25XXX	SCMH	279	11	75	165	Ø 6 5/8"	33 000	72 690	30–60
7006-7311-25XXX	SCMH	311	12 1/4	100	220	Ø 6 5/8"	36 750	80 950	30–60
7006-7349-25XXX	SCMH	349	13 3/4	120	164	Ø 6 5/8"	41 250	90 860	30–60
7006-7381-25XXX	SCMH	381	15	160	353	Ø 7 5/8"	45 000	99 120	30–60

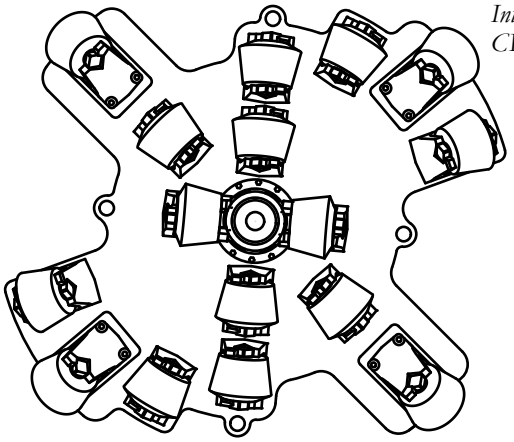
Note. Bit type SCMH is a selected bit for all rock formation. Approx. IADC code is 725.

Sandvik reaming heads

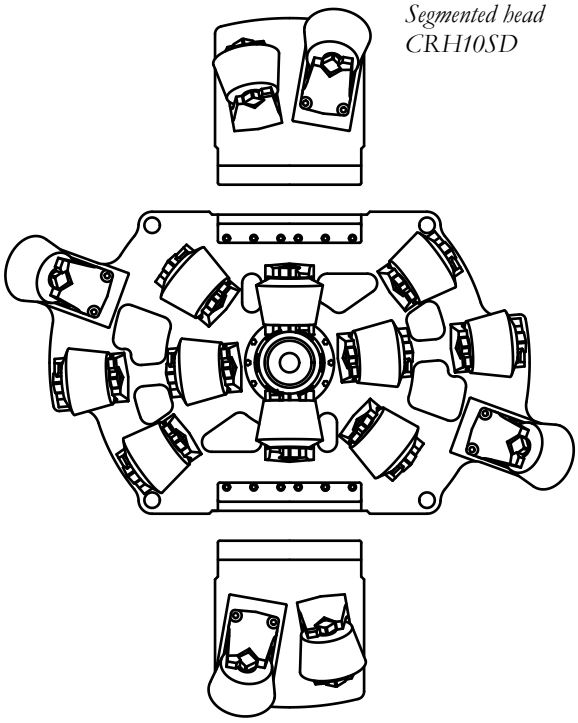
The Sandvik reaming heads are available in different types:

Integral heads ex. CRH10D
Segmented heads ex. CRH10SD
Extendable heads ex. CRH10E

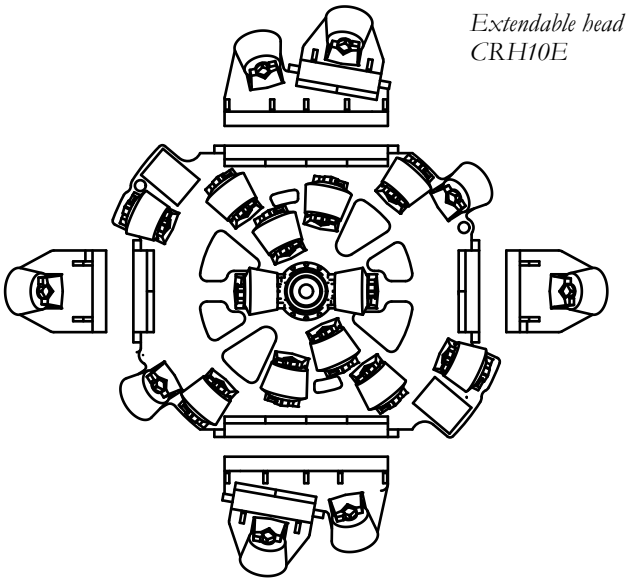
The figure in the name represents the reaming head diameter in feet (CRH10D=Ø 10'). Designs for other applications are available ex. blind boring up or down and for horizontal boring.
Segmented heads are used when reduced transport dimension and weight is required. Extendable heads are used for increased flexibility to drill different diameters using the same base head. All Sandvik reaming heads have bolted components for improved flexibility and ease of service and assembly.
The reaming heads are designed with different size of centre hole in order to fit stems for different pilot hole sizes. Part- and serial numbers are welded on the side of the reamer as a reamer ID.



Integral head CRH10D



Segmented head CRH10SD



Extendable head CRH10E

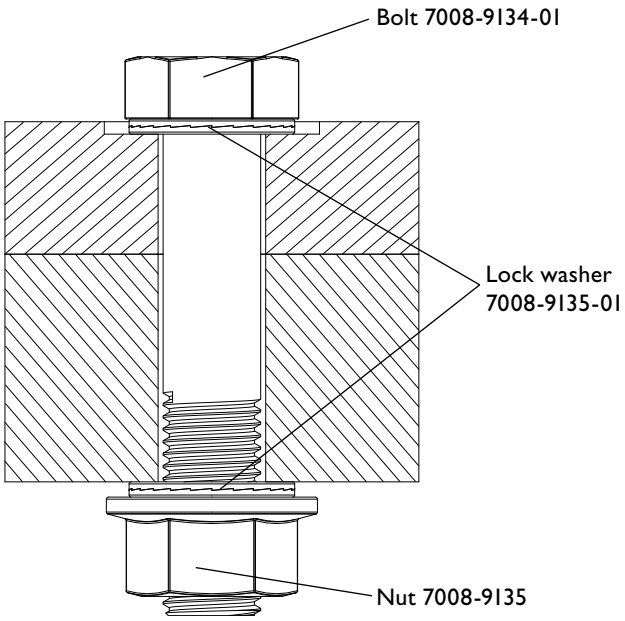
Mounting of saddles

1 The positions are marked on the side of the head frame. If there are two position marks, the upper one refers to the position nearest the head centre. Dowel pins locate the saddles in the correct position.

Note. Do not attach the saddles for position 1 and 2 before the stem is mounted. All bolts, nuts and contact surfaces must be flat, cleaned and oiled before mounting.

2 Tighten the bolts crosswise to 2/3 of full torque (≈800 Nm).
Finish by tighten to full strength 1200 Nm.
Always use new bolts and nuts, even when re-assembling.
The **Nord-lock** washers are reusable.

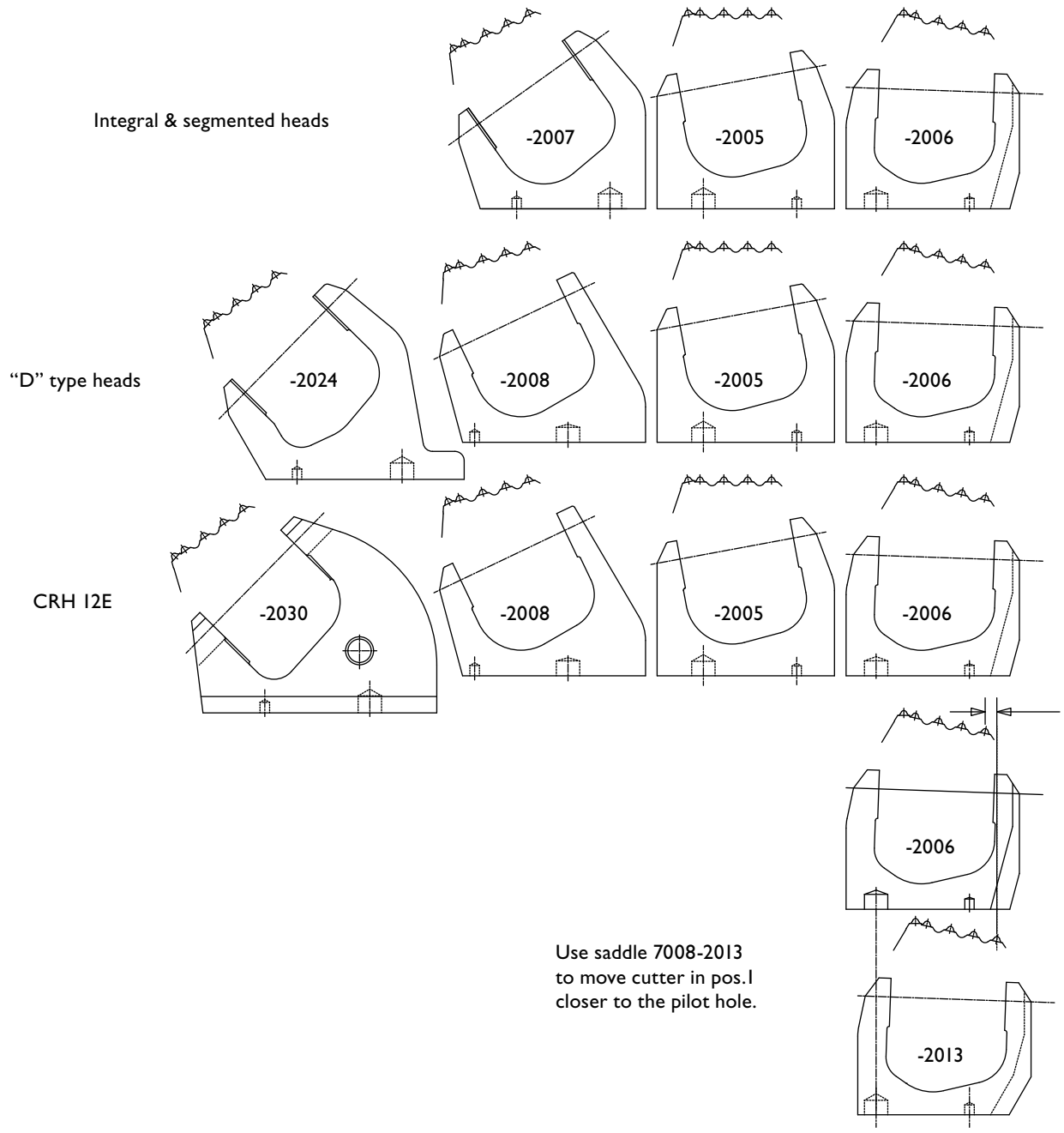
Example of tool combination



Mounting of saddles

Different saddle types are used depending on positioning and the reaming head type. The most frequent dressings as per the illustration below. The part numbers are 7008-2XXX (some additional saddles modified for small diameters reaming heads are not shown below). The number of the different types varies with the reaming head diameter and type.
A new and improved gauge saddle system is implemented on all "D" type reaming heads to make it possible to reduce the reamer diameter by changing the gauge saddles only. See page 10 for more detailed information.

A special inner saddle, 7008-2013, is used to move cutter in position 1 closer to the pilot hole when required and is used to keep a maximum spacing to obtain efficient spalling into the pilot hole. (See illustration below).
Saddle 7008-2013 is required in position 1 when :
- Ø 9 / 9 7/8" stem is used in reaming heads with 340 mm stem fit,
- Ø 12 1/4" stem is used in reaming heads with Ø 360 mm stem fit (exception CRH10SE),
- Ø 13 3/4" stem is used in reaming heads with Ø 390 mm stem fit (exception CRH12E).

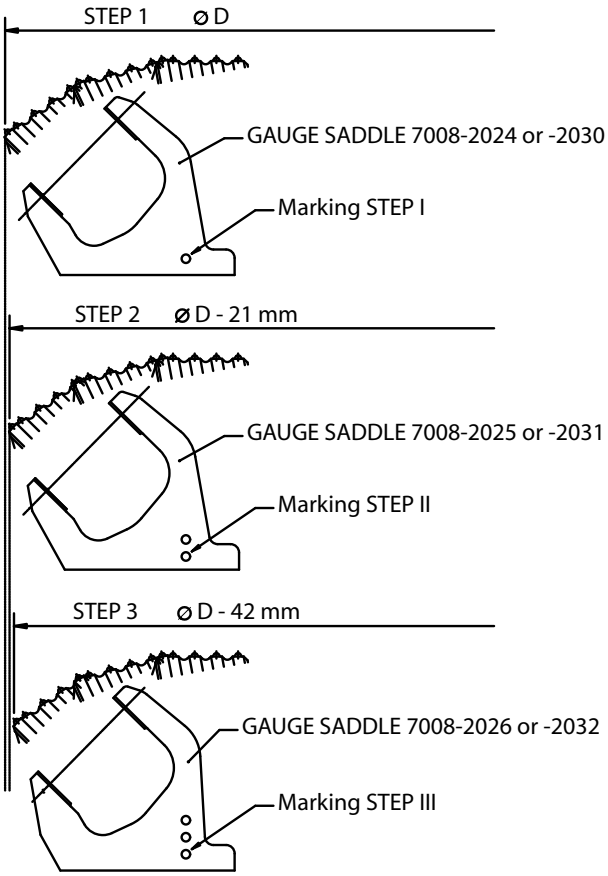


Mounting of saddles

Gauge saddle system with reduced reamer diameter option

The gauge saddle system on "D"-type reaming heads makes it possible to reduce the reamer diameter in two steps by changing the gauge saddles only (see illustrations). This option is valid on all Sandvik reaming heads that takes gauge saddles type 7008-2024 or 7008-2030. This option can be used in a long raise with heavy gauge button wear and makes it easier to reach the rock face again after lowering the reaming head for any service. The "D"-type gauge saddles have different part numbers and markings (see table and illustrations) in order to reduce the risk of mixing different types on the same reamer.

Diameter step No	Saddle part No	Marking on saddle side
I	7008-2024	○ – one hole drilled
II	7008-2025	○○ – two holes drilled
III	7008-2026	○○○ – three holes drilled
I	7008-2030	○ – one hole drilled
II	7008-2031	○○ – two holes drilled
III	7008-2032	○○○ – three holes drilled


STEP 1 ⌀D
GAUGE SADDLE 7008-2024 or -2030
Marking STEP I
STEP 2 ⌀D - 21 mm
GAUGE SADDLE 7008-2025 or -2031
Marking STEP II
STEP 3 ⌀D - 42 mm
GAUGE SADDLE 7008-2026 or -2032
Marking STEP III

Important!

Make sure to use four gauge saddles of the same type (same part no and marking) together on the reamer at all times to keep the correct profile.

Mounting of stem

1

Place the head on its side.

2

Clean the centre hole. Use a suitable solvent to remove the rust protection. Apply a lot of grease before fitting the stem.

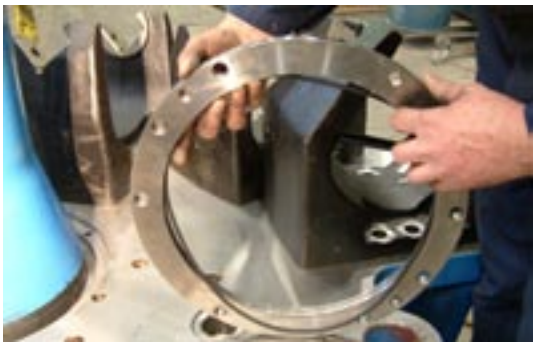
3

Insert the stem. Put a rod through the stem for easier handling. Clean and put a lot of grease on the inlet part of the stem. Use ordinary machine grease (0.5 kg).

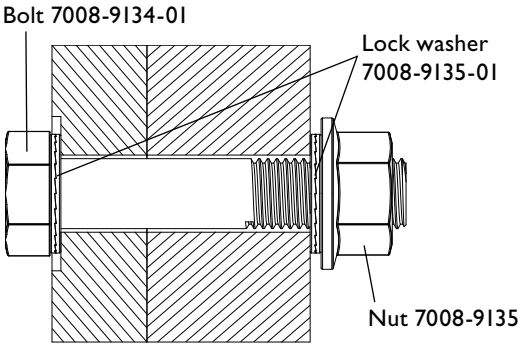
4

Push the stem into position.
Oil the bolts. Pre-tighten the bolt crosswise to 800 Nm.
Tighten to full torque 1200 Nm.

5



Clean the O-ring groove in the retainer ring and insert the O-ring.



Mounting of stem

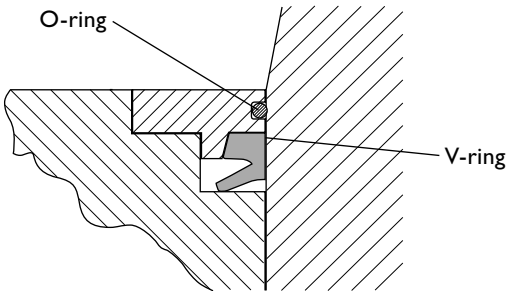
6

Clean the seal seat. Slide the V-ring over the top of the stem and push it into position. **Note**. *Do not use the V-ring in reaming head CRH3 and CRH4.*

7

Apply silicone sealant on top of the V-ring around the stem. Lower the retainer ring over the stem into position. Make sure both seals are properly seated.

8



9

Tighten the bolts cross-wise until the retainer ring is seated. Make-up torque 220 Nm.

10

Mount the saddles in position 1 and 2 (see picture on page 8). The head assembly is now complete.

Seal retainer

Part No.	Stem fit "dia", mm
7008-9380	340
7008-9381	360
7008-9398	390

Mounting of cutters

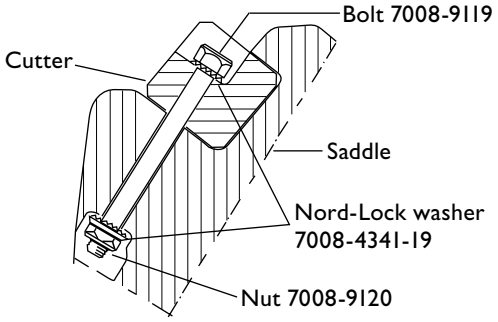
1

The positions are marked on the side of the head frame. If there are two position marks, the upper one refers to the position nearest the head centre.

2

Lift the cutters into position. See table on page 14-16 for correct positioning.

3



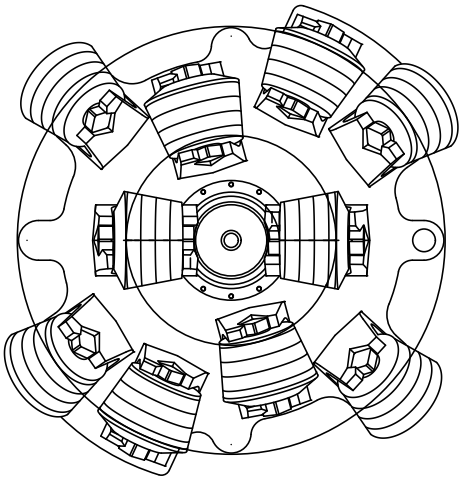
Put some oil on the bolt before tightening.

4

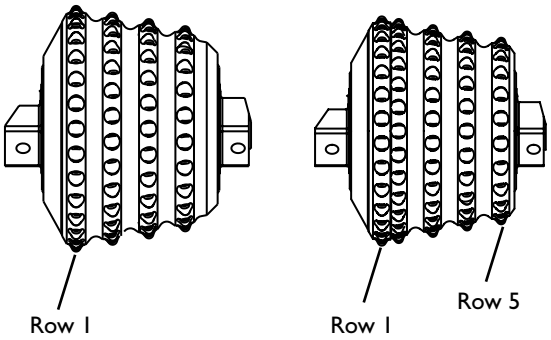
Tighten to 300 Nm.

Button row overlapping

On all Sandvik reaming heads there are button rows that are tracking (overlapping).



This feature (overlapping) can be used if there is a CMR41 cutter with button row No. 1 damaged or a CMR52 cutter with button row No. 1 or 5 damaged.
Mount them in overlapping positions to let the cutter next to it (outside or inside) without damaged button rows cut the rock in this track.



CMR 41 CMR 52

Mounting of cutters

The cutters are to be placed in different positions, depending on which spacing is required.
25,5 mm spacing is recommended for medium to hard rock, 51 mm spacing is recommended for soft rock.

Cutter positioning on integral- and segmented heads

Reaming head type	Head dia. mm	No. of cutters	Type of cutter	Position 25.5 mm spacing	Position 51 mm spacing
CRH 2	660	2	CMR 41 CMR 52	1 2	 1, 2
CRH 3*	950	4	CMR 41 CMR 52	1, 3 2, 4	1, 2 3, 4
CRH 3	1060	4	CMR 41 CMR 52	1, 3 2, 4	1, 2 3, 4
CRH 3**	1084*	4	CMR 41-27 CMR 52-27	1, 3 2, 4	1, 2 3, 4
CRH 4	1420	6	CMR 41 CMR 52	1, 3, 5 2, 4, 6	1, 2 3, 4, 5, 6
CRH 5	1524	8	CMR 41 CMR 52	1, 5, 7 2, 3, 4, 6, 8	4 1, 2, 3, 5, 6, 7, 8
CRH 6/6S	1829	10	CMR 41 CMR 52	1, 3, 5, 7, 9 2, 4, 6, 8, 10	3, 4, 5, 6 1, 2, 7, 8, 9, 10
CRH 7/7S	2134	12	CMR 41 CMR 52	1, 3, 5, 7, 9, 11 2, 4, 6, 8, 10, 12	3, 4, 5, 6, 7, 8 1, 2, 9, 10, 11, 12
CRH 8/8S/8D/8L	2440	14	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13 2, 4, 6, 8, 10, 12, 14	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 13, 14
CRH 9L	2749	14	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13 2, 4, 6, 8, 10, 12, 14	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 13, 14
CRH 10D/10SD	3048	16	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15 2, 4, 6, 8, 10, 12, 14, 16	5, 6, 7, 8, 9, 10, 11, 12 1, 2, 3, 4, 13, 14, 15, 16

Note! Cutter positioning when saddle 7008-2013 is used in position 1 (when a Ø 9", 9 7/8" stem is used in a reaming head with Ø 340 mm stem fit or when a Ø 12 1/4" stem is used in a reaming head with Ø 360 mm stem fit):
25,5 mm spacing: pos. 1, CMR 52; pos. 2, CMR 52.
51 mm spacing: pos. 1, CMR 52; pos. 2, CMR 41.

For cutter mounting of other Sandvik cutter types, consult your local Sandvik representative.

* CRH 3 Ø 950 mm, part number 7008-1009-30, is designed for 7 7/8" stem only!

** CRH 3 Ø 1084 mm, part number 7008-1311-30, is designed for 9" or 9 7/8" stems and CMR 41-27 / CMR 52-27 cutters only!

Mounting of cutters

The cutters are to be placed in different positions, depending on which spacing is required.
25,5 mm spacing is recommended for medium to hard rock, 51 mm spacing is recommended for soft rock.

Cutter positioning on extendable heads

CRH 10E

Reamer base 7008-1031-20, Ø360 stem fit and 7008-1331-20, Ø390 stem fit

Reaming head type	Head dia. mm	No. of cutters	Type of cutter	Position 25.5 mm spacing	Position 51 mm spacing
CRH 10E	3130	16	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15 2, 4, 6, 8, 10, 12, 14, 16	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 13, 14, 15, 16
CRH 10E	3500	18	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 14, 17, 19 2, 4, 6, 8, 10, 12, 16, 18, 20	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 14, 16, 17, 18, 19, 20
CRH 10E	3824	20	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 14, 17, 19, 21 2, 4, 6, 8, 10, 12, 16, 18, 20, 22	3, 4, 5, 6, 7, 8, 9, 10, 11, 12 1, 2, 14, 16, 17, 18, 19, 20, 21, 22

CRH 10ED

Reamer base 7008-1440-20, Ø360 stem fit and 7008-1340-20, Ø390 stem fit

Reaming head type	Head dia. mm	No. of cutters	Type of cutter	Position 25.5 mm spacing	Position 51 mm spacing
CRH 10ED	3500	18	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13B, 15,17 2, 4, 6, 8, 10, 12, 14B, 16,18	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 13B, 14B, 15, 16,17,18
CRH 10ED	3687	20	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19 2, 4, 6, 8, 10, 12, 14, 16, 18, 20	3, 4, 5, 6, 7, 8, 9, 10,11,12 1, 2, 13, 14, 15, 16, 17, 18, 19, 20
CRH 10ED	3824	20	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13B, 15, 17, 19 2, 4, 6, 8, 10, 12,14B, 16, 18, 20	3, 4, 5, 6, 7, 8, 9, 10, 11, 12 1, 2, 13B, 14B, 15, 16, 17, 18, 19, 20
CRH 10ED	4042	22	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	3, 4, 5, 6, 7, 8, 9, 10, 11, 12 1, 2,13, 14, 15, 16, 17, 18, 19, 20, 21, 22

CRH 10SE

Reamer base 7008-1630-20, Ø360 stem fit

Reaming head type	Head dia. mm	No. of cutters	Type of cutter	Position 25.5 mm spacing	Position 51 mm spacing
CRH 10SE	3047	16	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15 2, 4, 6, 8, 10, 12, 14, 16	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 13, 14, 15, 16
CRH 10SE	3372	18	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17 2, 4, 6, 8, 10, 12, 14, 16, 18	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 13, 14, 15, 16, 17, 18
CRH 10SE	3696	20	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19 2, 4, 6, 8, 10, 12, 14, 16, 18, 20	3, 4, 5, 6, 7, 8, 9, 10, 11, 12 1, 2, 13, 14, 15, 16, 17, 18, 19, 20

Note!

Cutter positioning when saddle 7008-2013 is used in position 1 (when a Ø 12 1/4" stem is used in a reaming head with Ø 360 mm stem fit with exception for CRH10SE or when a Ø 13 3/4" stem is used in a reaming head with Ø 390 mm stem fit with exception for CRH12SE):
25,5 mm spacing: pos. 1, CMR 52; pos. 2, CMR 52.
51 mm spacing: pos. 1, CMR 52; pos. 2, CMR 41.
For cutter mounting of other Sandvik cutter types, consult your local Sandvik representative.

Mounting of cutters

The cutters are to be placed in different positions, depending on which spacing is required.
25,5 mm spacing is recommended for medium to hard rock, 51 mm spacing is recommended for soft rock.

Cutter positioning on extendable heads

CRH 12E

Reamer base 7008-1338-20, Ø390 stem fit

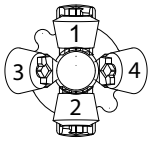
Reaming head type	Head dia. mm	No. of cutters	Type of cutter	Position 25.5 mm spacing	Position 51 mm spacing
CRH 12E	3534	18	CMR 41 CMR 53	1, 3, 5, 7, 9, 11, 13, 15, 17 2, 4, 6, 8, 10, 12, 14, 16, 18	3, 4, 5, 6, 7, 8, 9, 10 1, 2, 11, 12, 13, 14, 15, 16, 17, 18
CRH 12E	3840	20	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19 2, 4, 6, 8, 10, 12, 14, 16, 18, 20	3, 4, 5, 6, 7, 8, 9, 10, 11, 12 1, 2, 13, 14, 15, 16, 17, 18, 19, 20
CRH 12E	4146	22	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22	3, 4, 5, 6, 7, 8, 9, 10, 11, 12 1, 2, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
CRH 12E	4500	24	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 1, 2, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
CRH 12E	5000	26	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 1, 2, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
CRH 12E	5100	26	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 1, 2, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
CRH 12E	5520	30 (32)	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, (31) 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, (32)	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 1, 2, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, (31), (32)
CRH 12E	5876	32 (36)	CMR 41 CMR 52	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, (29), (31), 33, 35 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, (30), (32), 34, 36	3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 1, 2, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, (29), (30), (31), (32), 33, 34, 35, 36

For cutter mounting of other Sandvik cutter types, consult your local Sandvik representative.
Cutter positions in parantheses (X), are for optional use, when heavy gauge wear is expected.

Mounting of cutters

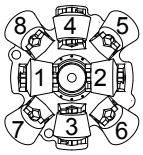
CRH 2
Ø 660/26"

CRH 3
Ø 950/37"
Ø 1060/42"
Ø 1084/43"

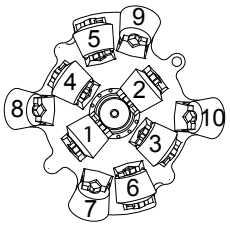


CRH 4
Ø 1420/56"

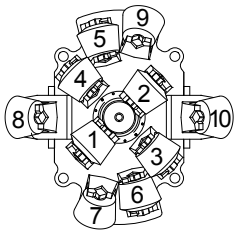
CRH 5
Ø 1524/60"



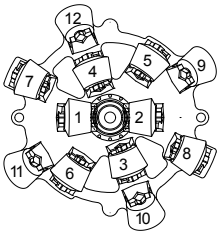
CRH 6
Ø 1829/72"



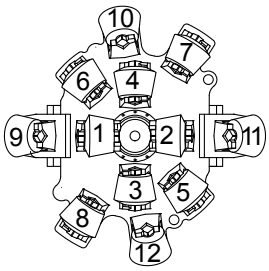
CRH 6S
Ø 1829/72"



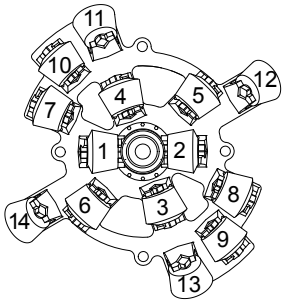
CRH 7
Ø 2134/84"



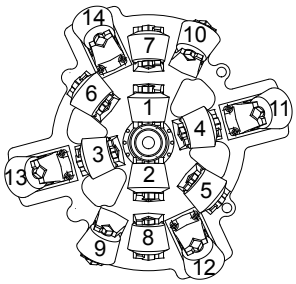
CRH 7S
Ø 2134/84"



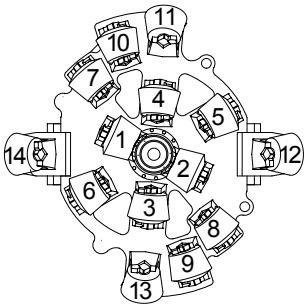
CRH 8/8L
Ø 2440/96"



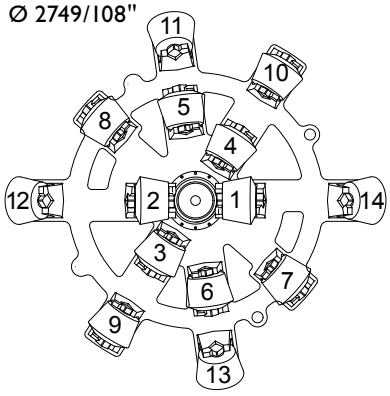
CRH 8D
Ø 2447/96"



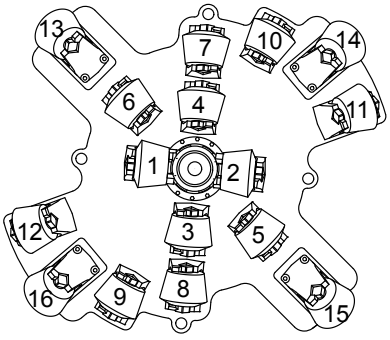
CRH 8S
Ø 2440/96"



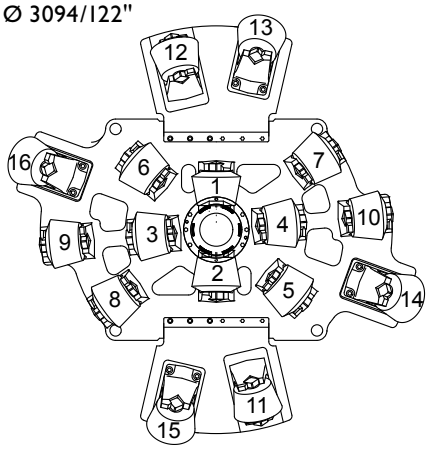
CRH 9L
Ø 2749/108"



CRH 10D
Ø 3094/122"



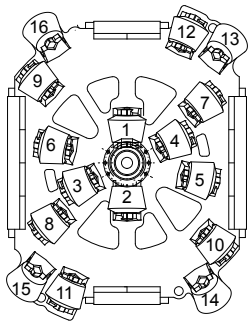
CRH 10SD
Ø 3094/122"



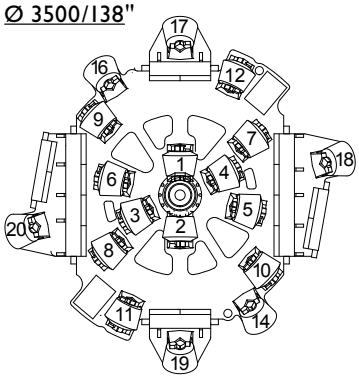
Mounting of cutters

CRH 10E

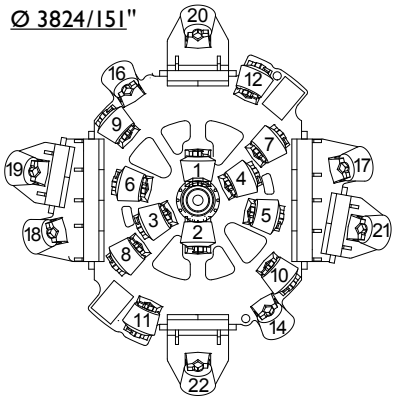
Ø 3130/123"



Ø 3500/138"

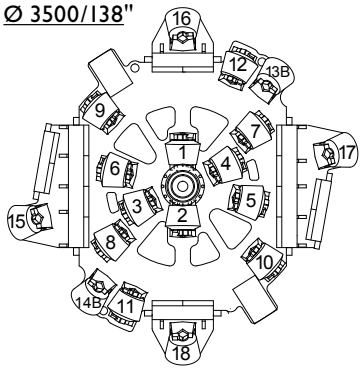


Ø 3824/151"

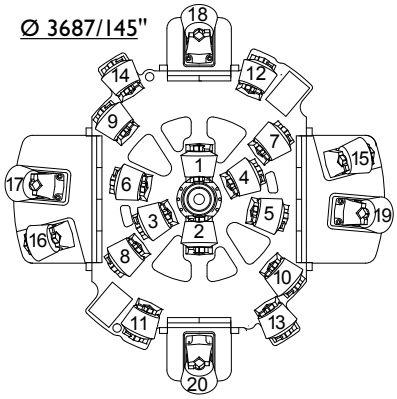


CRH 10ED

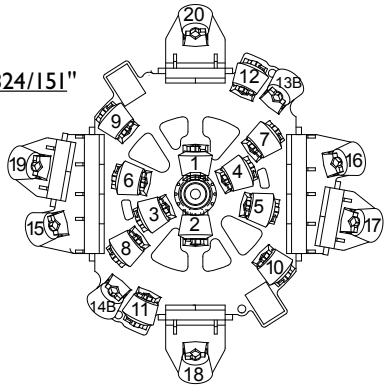
Ø 3500/138"



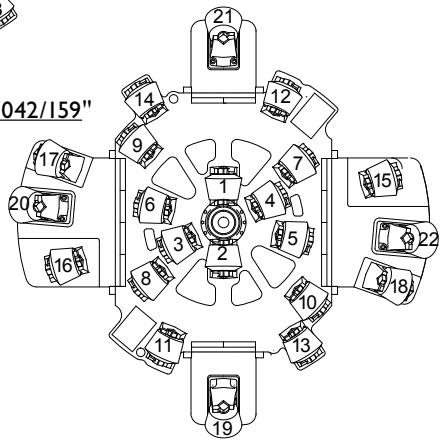
Ø 3687/145"



Ø 3824/151"

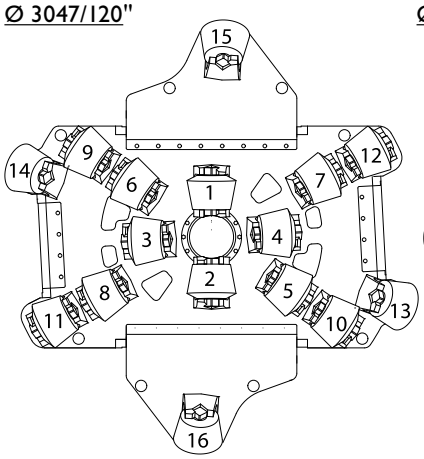


Ø 4042/159"

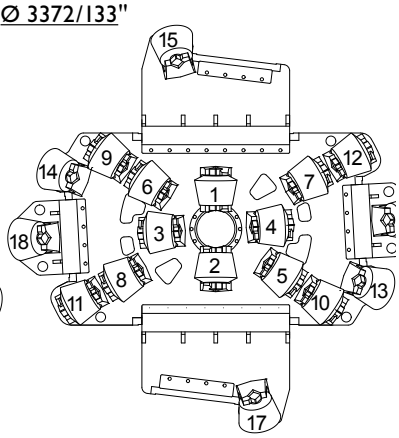


CRH 10SE

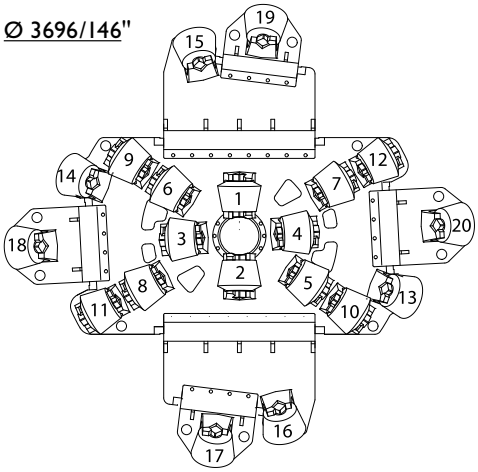
Ø 3047/120"



Ø 3372/133"



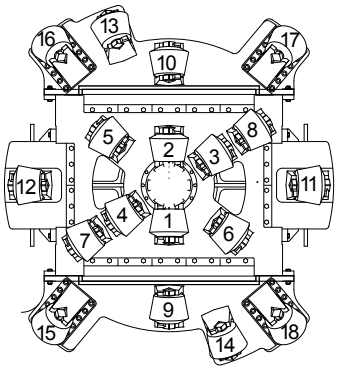
Ø 3696/146"



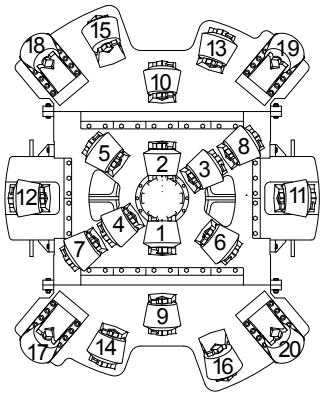
Mounting of cutters

CRH 12E

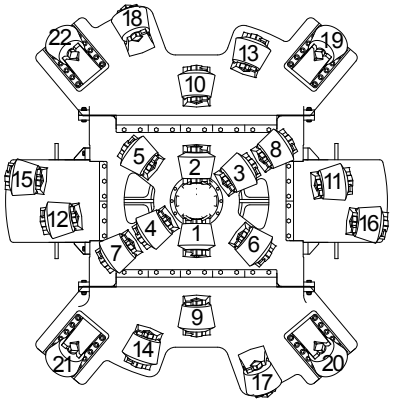
Ø 3534/139"



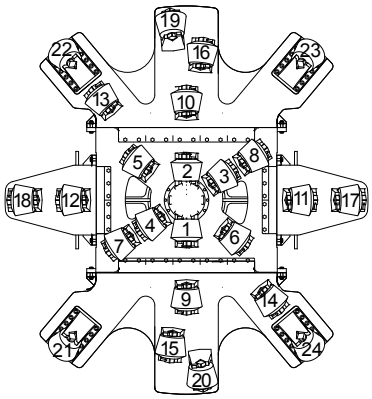
Ø 3840/151"



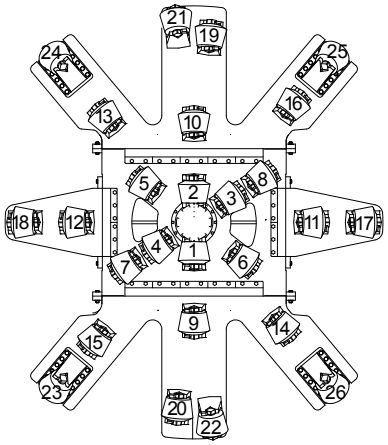
Ø 4146/163"



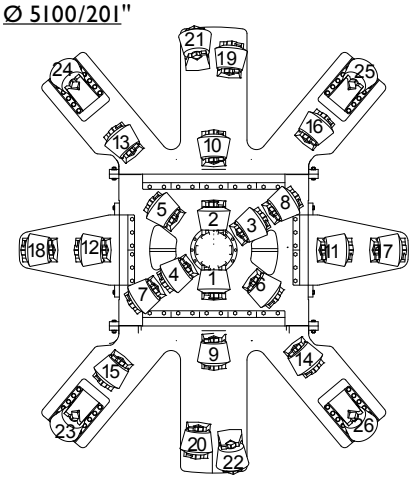
Ø 4500/177"



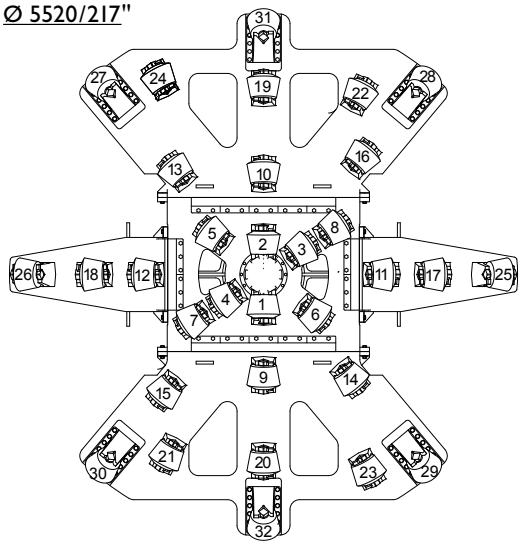
Ø 5000/197"



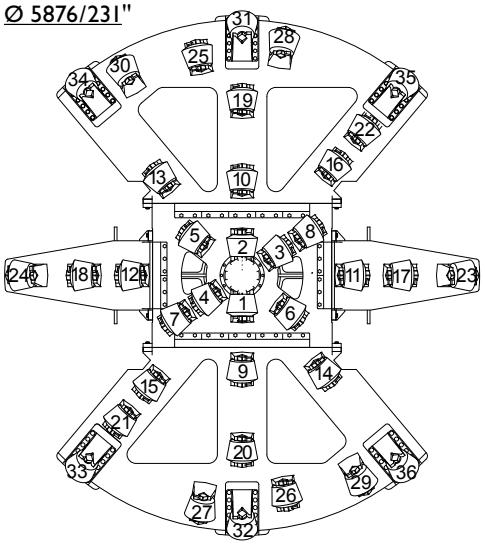
Ø 5100/201"



Ø 5520/217"



Ø 5876/231"

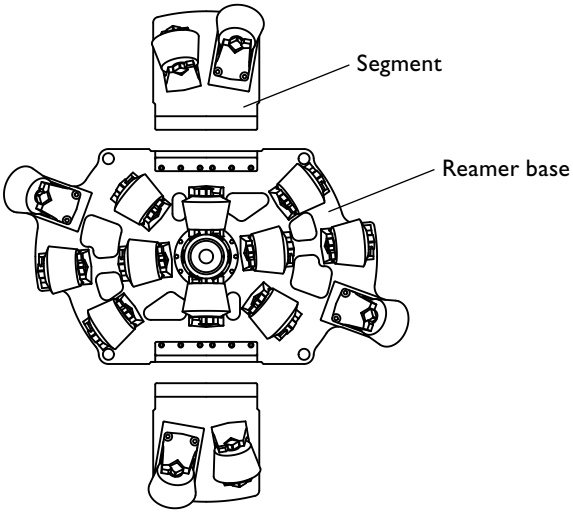


Mounting of segments

CRH 6S, 7S, 8S, 10SD
CRH 10E, 10ED, 10SE

Segmented heads are designed in order to facilitate transportation through narrow openings. The reamer base is transported with the segments dismounted until the collaring site is reached.

Reaming head type	Base head part no.	Segment part no.	No. of cutters
CRH 6S	7008-1418-21	7008-2101-20	10
CRH 7S	7008-1421-21	7008-2101-20	12
CRH 8S	7008-1424-21	7008-2101-20	14
CRH 10SD	7008-1831-21	7008-2142-20	16



1

Clean all contact surfaces. Oil bolts, nuts, wedge and slot-wedge. Hook the segment on to the head as shown. Start to tighten the upper wedge joint.

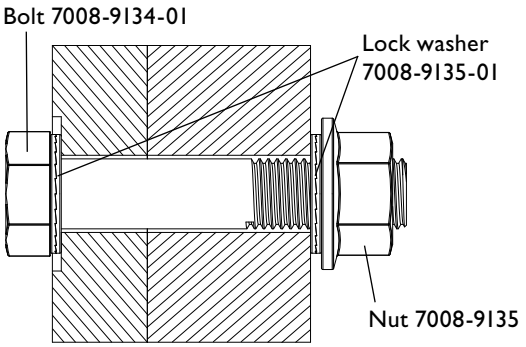
2

Fit the upper wedge.

3

Fit the slot wedge. Tighten all bolt joints to 2/3 torque (≈800 Nm). Tighten to full torque 1200 Nm. Begin with upper wedge. Repeat on slot-wedge.

4



Complete the segment assembly by tightening the bolt/nut joints. Start with 2/3 torque (≈800 Nm). Tighten to full torque 1200 Nm.
Example of tool combination see page 8.

Segment part number: 7008-XXXX-YY
ex: 7008-2109-20 (without saddles)
7008-2109-30 (with saddles)

Mounting of segments

Segment positioning on CRH 10E

Reamer base 7008-1031-20, Ø360 stem fit and 7008-1331-20, Ø390 stem fit

Reaming head type	Head dia. mm	No. of cutters	No. of segments	Segment part number	Segment part number	Segment part number
CRH 10E	3130	16	base only			
CRH 10E	3500	18	2 + 2	7008-2109-20	7008-2110-20	
CRH 10E	3824	20	2 + 2 + 2	7008-2109-20	7008-2110-20	7008-2111-20

Segment positioning on CRH 10ED

Reamer base 7008-1440-20, Ø360 stem fit and 7008-1340-20, Ø390 stem fit

Reaming head type	Head dia. mm	No. of cutters	No. of segments	Segment part number	Segment part number	Segment part number
CRH 10ED	3500	18	2 + 2	7008-2109-20	7008-2110-20	
CRH 10ED	3687	20	2 + 2	7008-2152-20	7008-2153-20	
CRH 10ED	3824	20	2 + 2 + 2	7008-2109-20	7008-2110-20	7008-2111-20
CRH 10ED	4042	22	2 + 2	7008-2144-20	7008-2145-20	

Segment positioning on CRH 10SE

Reamer base 7008-1630-20, Ø360 stem fit

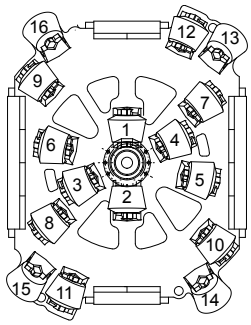
Reaming head type	Head dia. mm	No. of cutters	No. of segments	Segment part number	Segment part number	Segment part number
CRH 10SE	3047	16	2	7008-2134-20		
CRH 10SE	3372	18	2 + 2	7008-2135-20	7008-2136-20	
CRH 10SE	3696	20	2 + 2 + 2	7008-2135-20	7008-2136-20	7008-2138-20

Mounting of segments

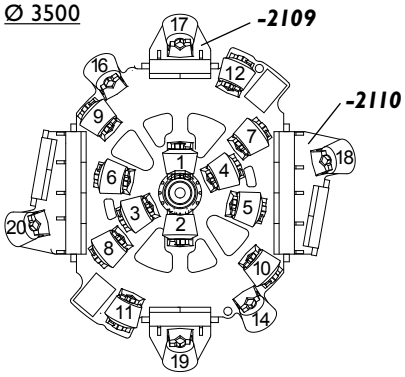
Segment positioning

CRH 10E

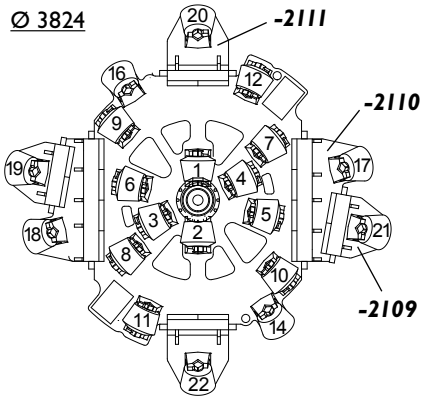
Ø 3130



Ø 3500

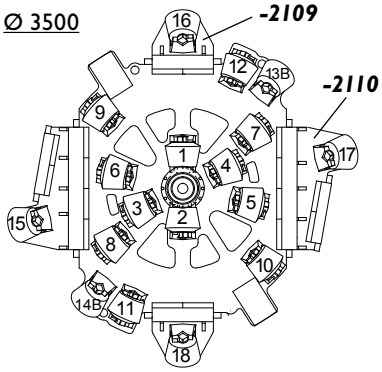


Ø 3824

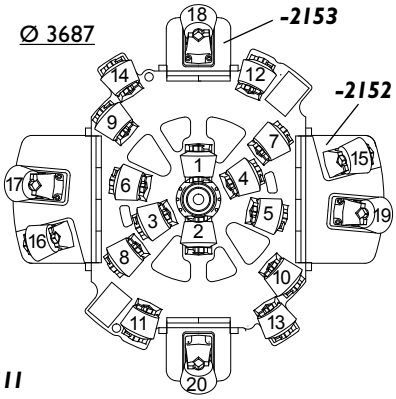


CRH 10ED

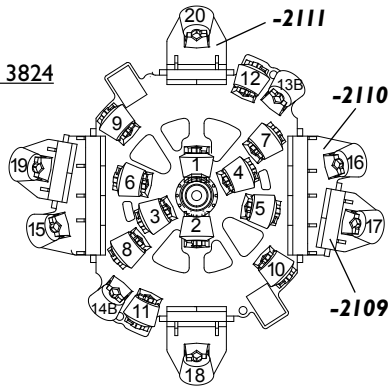
Ø 3500



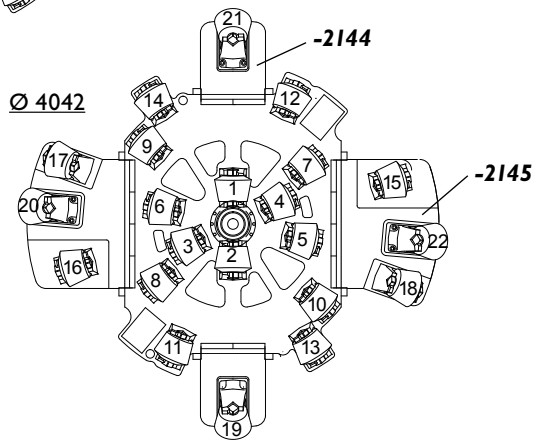
Ø 3687



Ø 3824

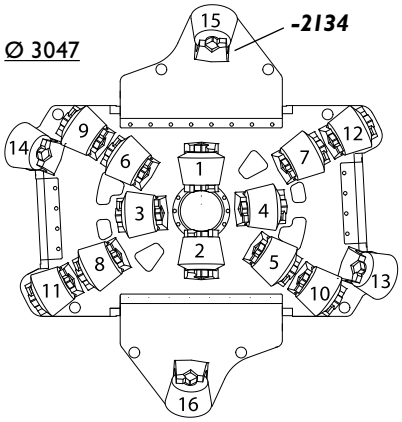


Ø 4042

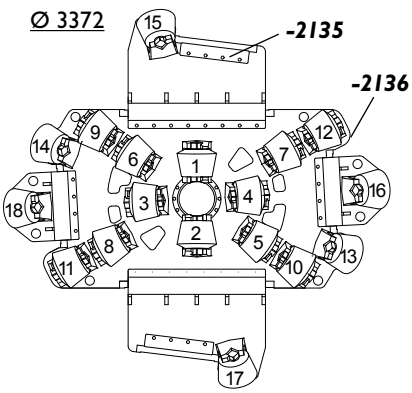


CRH 10SE

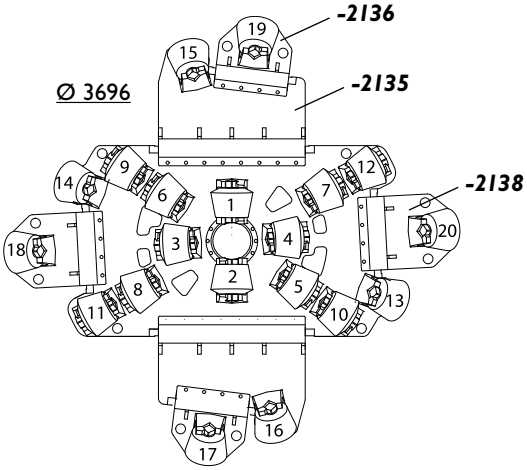
Ø 3047



Ø 3372



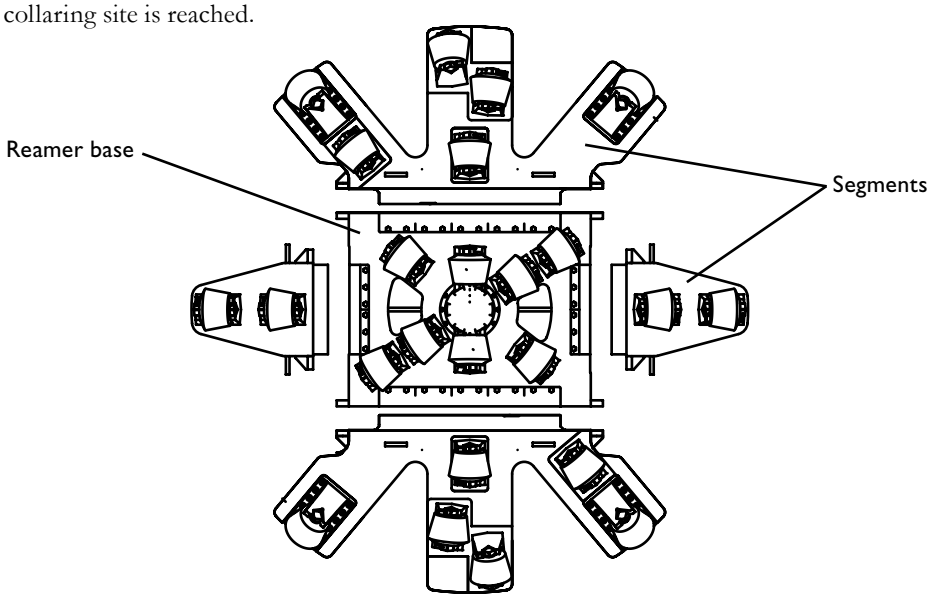
Ø 3696

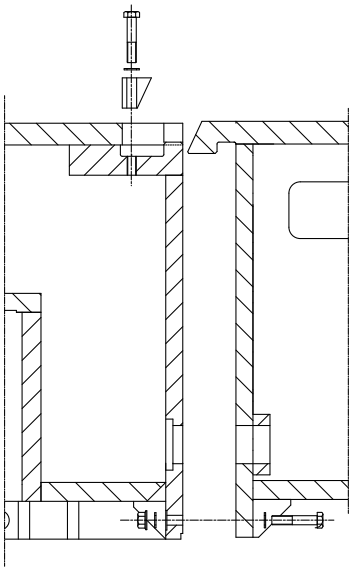


Mounting of segments

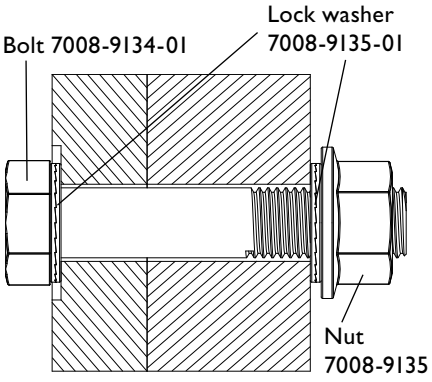
CRH 12E

The CRH 12E system is a user friendly design which facilitates transportation through narrow openings and substancially reduces the time for assembly.
The reamer base is transported with the segments dismounted until the collaring site is reached.

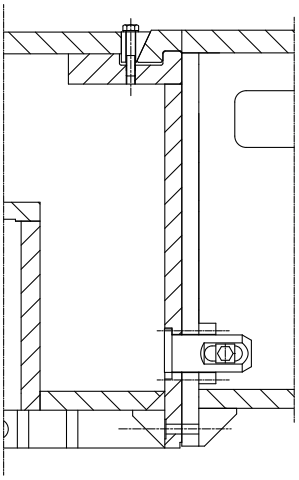




Clean all contact surfaces, oil bolts, nuts and wedges. Hook the segments on to the head as shown. Start to tighten the upper wedge joints.



Begin with the wedge in the middle and work your way outwards. Tighten the bolts to 2/3 torque (800 Nm). Continue with the bolt joints on the sides and at the bottom of the segments. Tighten to 2/3 torque(800 Nm). Tighten to full torque (1200 Nm). Use the same sequense as when tightening to 2/3 torque.



Use the slot-wedge bolts if it is impossible to mount the bolts at the bottom of the segments. Example of tool combination see page 8.

Mounting of segments

Segment positioning on CRH 12E

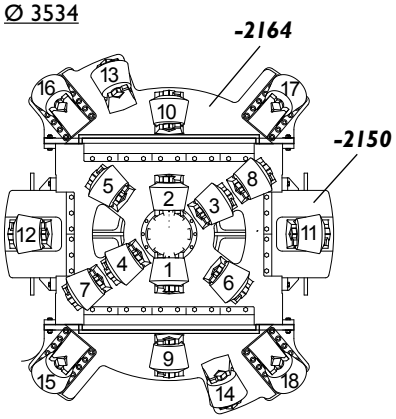
Reamer base 7008-1338-20, Ø390 stem fit

Reaming head type	Head dia. mm	No. of cutters	No. of segments	Segment (small) part number	Segment (large) part number
CRH 12E	3534	18	2 + 2	7008-2150-20	7008-2164-20
CRH 12E	3840	20	2 + 2	7008-2150-20	7008-2151-20
CRH 12E	4146	22	2 + 2	7008-2161-20	7008-2162-20
CRH 12E	4500	24	2 + 2	7008-2149-20	7008-2148-20
CRH 12E	5000	26	2 + 2	7008-2147-20	7008-2146-20
CRH 12E	5100	26	2 + 2	7008-2159-20	7008-2160-20
CRH 12E	5520	30 (32)	2 + 2	7008-2154-20	7008-2155-20
CRH 12E	5876	32 (36)	2 + 2	7008-2156-20	7008-2158-20

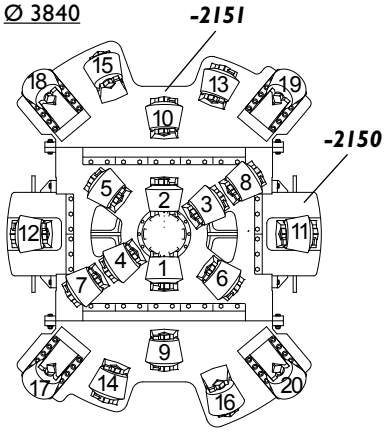
Mounting of segments

CRH 12E

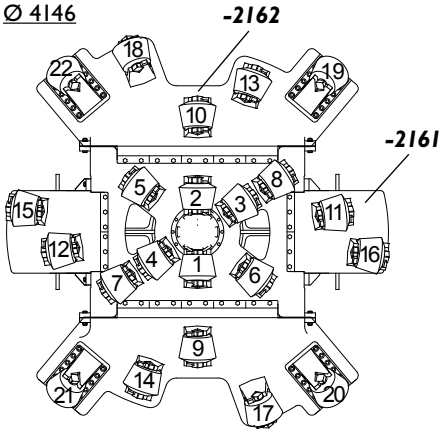
Ø 3534



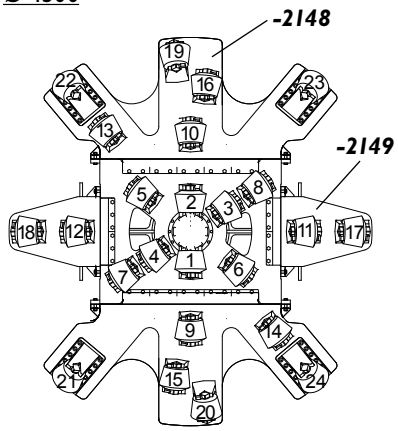
Ø 3840



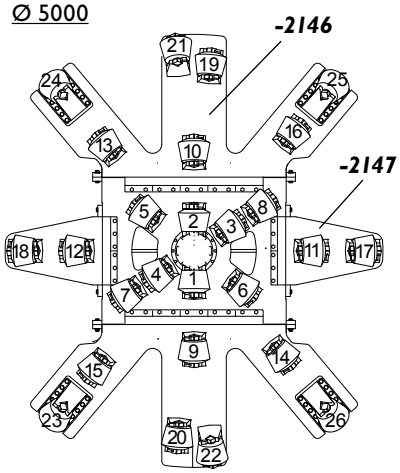
Ø 4146



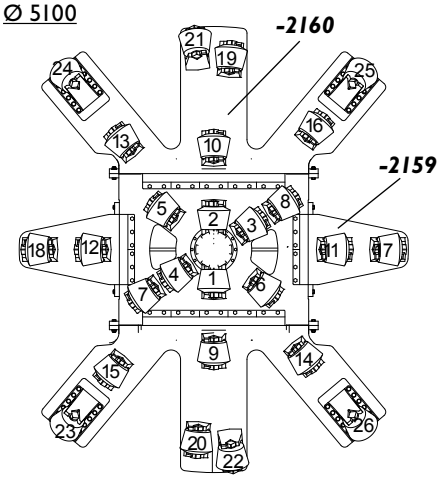
Ø 4500



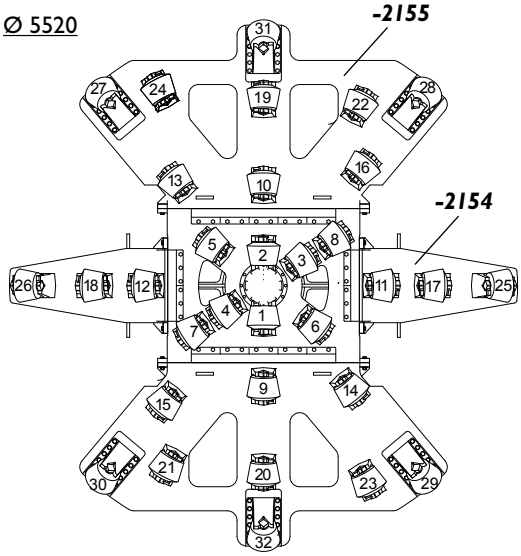
Ø 5000



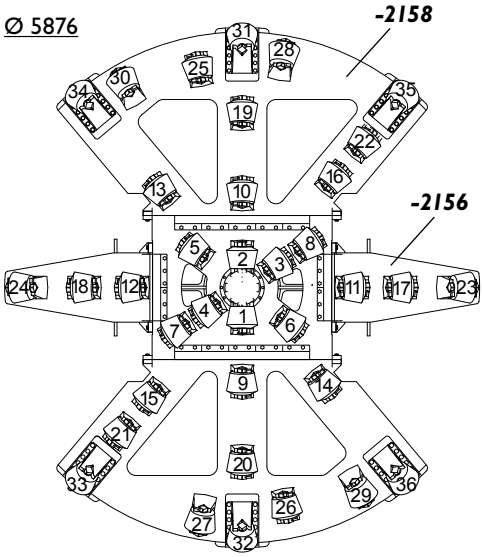
Ø 5100



Ø 5520



Ø 5876

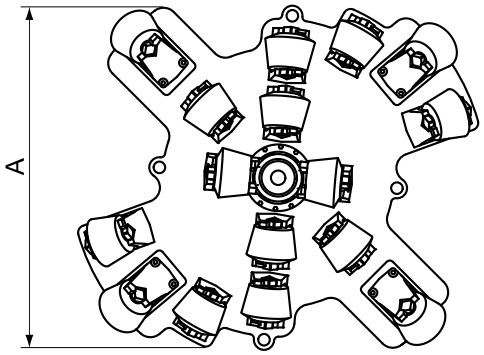


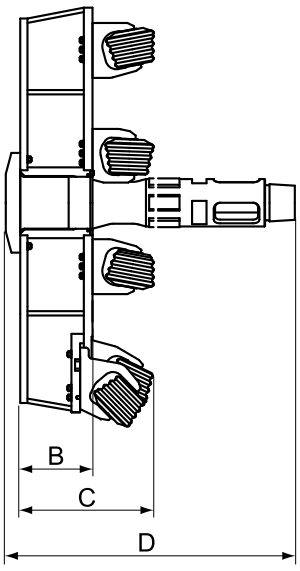
Transport dimensions and weights

Integral reaming heads

Note. Weights as noted in tables are only to be used as a guide.

Reaming head type	Transport dimensions, mm A	B	C	D	Weight incl. saddles kg	Weight complete incl. saddles & stem kg
CRH 2	655			1500		800
CRH 3	850	400	826	1900	1000	2200*
CRH 4	1010	400	826	1900	1450	2650*
CRH 5	1220	400	826	1900	2050	3250*
CRH 6	1510	400	826	1900	2650	3850*
CRH 7	1720	400	826	1900	3200	4400*
CRH 8	1930	400	826	1900	3900	5100*
CRH 8D	2040	400	826	1900	4150	5350*
CRH 8L	1930	500	926	2100	4250	5550**
CRH 9	2200	500	926	2100	5100	6400**
CRH 10D	2280	500	926	2600	6750	8550***
Stem 12 1/4" – 30*				1900	1200	
Stem 12 1/4" – 40**				2100	1300	
Stem 13 3/4" – 40***				2700	1800	



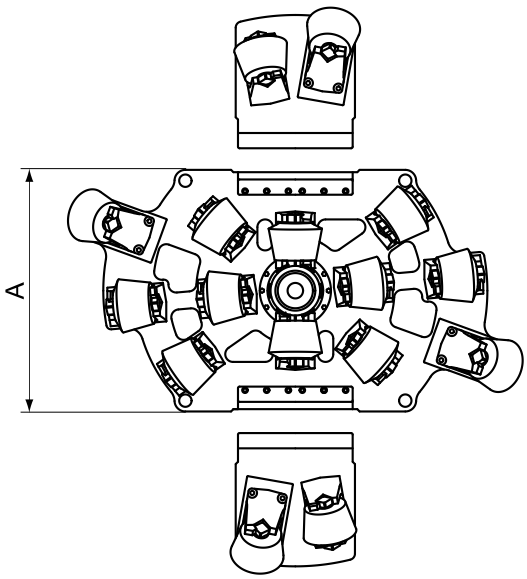


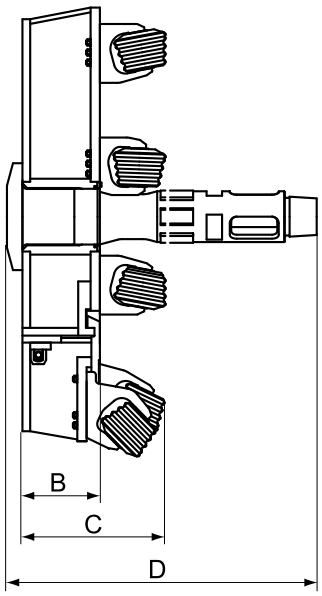
Transport dimensions and weights

Segmented reaming heads

Note. Weights as noted in tables are only to be used as a guide.

Item	Transport dimensions, mm				Weight/piece incl. saddles kg	Weight complete incl. saddles, segments & stem kg
	A	B	C	D		
CRH 6S reamer base	1050	400	826	1900	2300	3950*
CRH 7S reamer base	1325	400	826	1900	2950	4600*
CRH 8S reamer base	1631	400	826	1900	3950	5600*
CRH 10SD reamer base	1560	500	926	2700	4950	8750***
Segment to CRH 6S, 7S, 8S	430	400	826		225	
Segment to CRH 10SD	770	500	926		1000	
Stem 12 1/4" – 30*				1900	1200	
Stem 12 1/4" – 40				2100	1300	
Stem 13 3/4" – 40***				2700	1800	





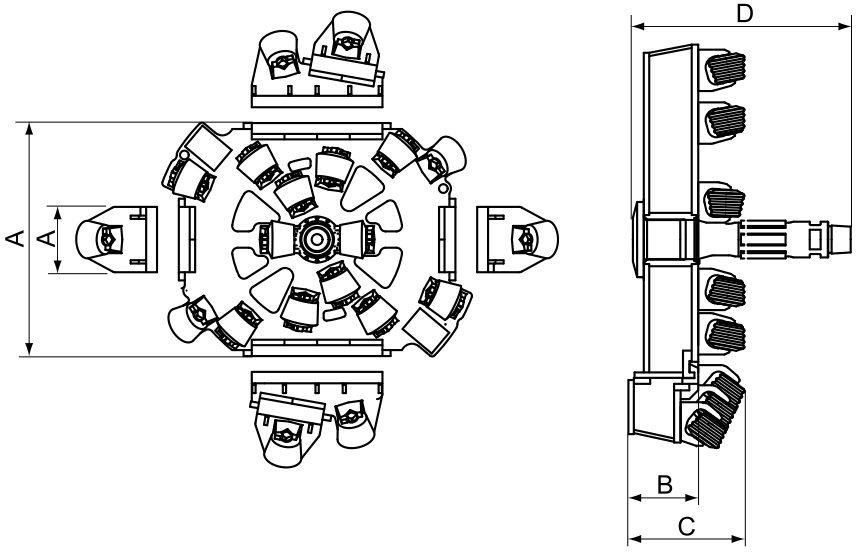
Transport dimensions and weights

Extendable reaming heads

Note. Weights as noted in tables are only to be used as a guide.

Item	Reamer Ø mm	Transport dimensions, mm A	B	C	D	Weight / piece incl. saddles kg
Reamer base CRH 10E	3130	2140	590	1015	2600	7700
Segment – 2109	3500 and 3824	610				375
Segment – 2110	3500 and 3824	720				825
Segment – 2111	3824	610				500
Reamer base CRH 10ED	-	2140	590	1015	2600	7550
Segment – 2144	4042	610				750
Segment – 2145	4042	965				1625
Segment – 2152	3687	785				1050
Segment – 2153	3687	610				550
Reamer base CRH 10SE	-	1560	590	1015	2600	6725
Segment – 2134	3047	815				700
Segment – 2135	3372 and 3696	950				1250
Segment – 2136	3372 and 3696	610				400
Segment – 2138	3696	610				500
Stem Ø 12 1/4" – 40				2100		1300
Stem Ø 13 3/4" – 40				2700		1800
Stem Ø 15" – 50				3100		2400

Complete reamer incl. base, segments and Ø 13 3/4" stem weight / diameter, kg								
Reaming head type	**Ø 3130**	**Ø 3500**	**Ø 3824**	**Ø 3687**	**Ø 4042**	**Ø 3047**	**Ø 3372**	**Ø 3696**
CRH 10SE	9500	11750	12750					
CRH 10ED		11750	12750	12550	14100			
CRH 10SE						9925	11825	12825



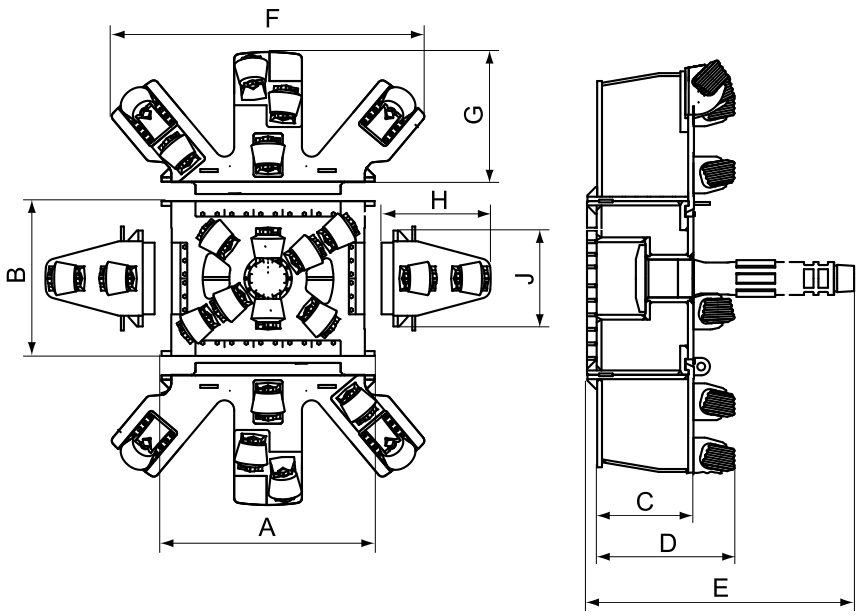
Transport dimensions and weights

CRH 12E

Note. Weights as noted in tables are only to be used as a guide.

Reaming head	Transport dimensions, mm								
CRH 12E	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
Ø 3534	2200	1600	1105	1530	3100	2470	910	645	990
Ø 3840	2200	1600	1105	1530	3100	2800	1145	645	990
Ø 4100	2200	1600	1105	1530	3100	3000	1155	925	990
Ø 4500	2200	1600	1105	1530	3100	3230	1470	1140	990
Ø 5000	2200	1600	1105	1530	3100	3550	1700	1190	990
Ø 5100	2200	1600	1105	1530	3100	3550	1700	1215	990
Ø 5520	2200	1600	1105	1530	3100	3810	1975	1783	990
Ø 5876	2200	1600	1105	1530	3100	4090	2170	1783	990
Stem Ø 13 3/4" – 50					2700				
Stem Ø 15" – 50					3100				

Reaming head CRH 12E	Weight Reamer base kg/pce incl. saddles	Large segment kg/pce incl. saddles	Small segment kg/pce incl. saddles	Ø 15" Stem, kg	Complete incl. base, segments and stem, kg
Ø 3534	8200	3580	1250	2400	20260
Ø 3840	8200	4775	1250	2400	22650
Ø 4100	8200	5360	1300	2400	23920
Ø 4500	8200	5655	1550	2400	25010
Ø 5000	8200	6650	1700	2400	27300
Ø 5100	8200	6650	1700	2400	27300
Ø 5520	8200	9200	1925	2400	32850
Ø 5876	8200	10000	1925	2400	34450



Inspection

In order to keeep your reaming head in good working conditioning we recommend an inspection after each raise.

Check the following.
- Wear pad diameter on stem
- For cracks in the wrench flats and in the thread of the stem
- Stem/reamer base bolt joints
- Saddle bolts
- Conditioning of the journal seats in the saddles
- Contact surface between saddle/reamer base

Check the following on the cutters.
- Button condition, use cutter gauge 7008-9445
- Seal/bearing. If the cutter is easy to rotate it needs re-greasing, follow the instructions on page 33.

Serial number location on the different components see below.

Cutter serial number is found on the shaft end of the narrow part of the cutter and on the ball plug retainer.

The stem is marked at the bottom flange and on the thread top.

Head serial number is found on one side of the head frame.

Cutter gauge 7008-9445 for measuring of button wear over the gauge button row of the cutters. The figures tell you the percentage of the protrosion left.

Removal of stem

1

Remove the inner saddles from position 1 and 2. Use the tool combination on page 8.

2

Dismount the seal retainer ring. Use the two releasing holes and tighten cross-wise until the retainer ring comes loose.

3

Dismount the twelve clamping bolts. Remove the protection bolts from the jacking holes in the stem flange. Insert four of the loose bolts and tighten cross-wise until the stem is released.

4

Put a rod through the stem and attach the lifting equipment. Pull the stem out.

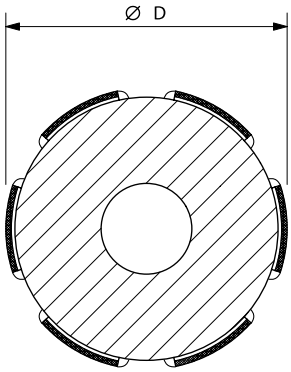
Important!

When the stem and the saddles are reassembled, new bolts and nuts must be used.

Wear pad replacement

Replace the wear pads when the diameter D is less than shown in the table below.

Pilot hole diameter	Ø D mm	Wear pads Quantity	Wear pads thin type Part No.
7 7/8"	192	4	7008-9020
9"	220	5	7008-9023
9 7/8"	242	5	7008-9025-05
11"	271	6	7008-9028-05
12 1/4"	303	6	7008-9031-05
13 3/4"	341	12	7008-9034-05
15"	373	24	7008-9038-05



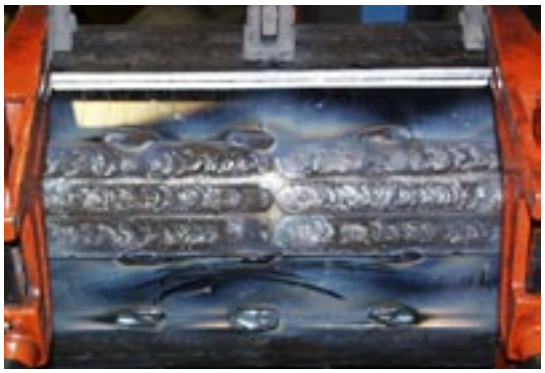
1

Remove the worn out wear pads by grinding away the welding joint. Pre-heat the area where the wear pads are to be welded to 370-450° C. Should the temperature drop to below 370°. Reheat before continuing.

2

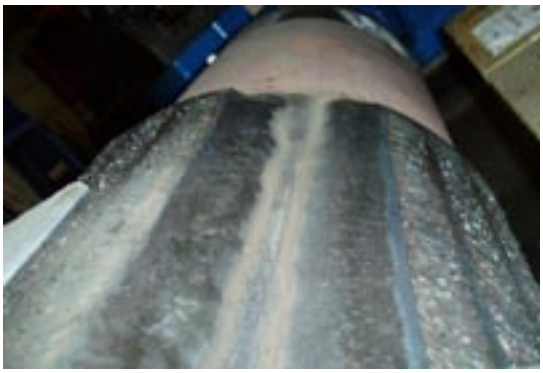
Fix the wear pads in position with clamps. Important! Make sure the ID of the wear pad corresponds with the OD of the stem.

3



Tack weld the pads to the stem.

4



Fill the welding points properly using our recommended welding wire. After welding, the diameter over the wear pads must be checked. If some peeks exceed D-max, grind with a silicon carbide grinding wheel.

5

Make the welding joints ± 10 mm longer than the wear pad and end with a smooth finish.

Recommended diameter over wear pads;

Pilot hole	D-max, mm
7 7/8"	200
9"	228
9 7/8"	251
11"	280
12 1/4"	311
13 3/4"	349
15"	381

Re-greasing of cutters

1

Remove the plastic protection cup and the snap ring.

2

Pull out the ball plug retainer.

3

Remove the conical plugs (7008-9257) from the seal retainers. Use proper allen key wrench (7008-9447).

4

Clean the centre hole carefully. Install the re-greasing plug and attach the grease gun.

5

Start pumping until grease comes out through one of the relief holes. Clean the thread and mount the plug. Put some Loctite222 on the thread before tightening. Use the allen key wrench.

6

Rotate the cutter 20 revolutions. Continue to pump until grease comes out through the other relief hole. Mount a conical plug in this hole in the same way.

7

Re-install the ball plug retainer. Mount a new snap ring and a plastic protection cap together with new o-rings.

Spares for re-greasing/ cutter

Pcs	Part No.	Item
2	7008-9115	O-ring
2	7008-9257	Conical plug
1	7008-9114	Snap ring
1	7008-9482	Protection plug
1	7008-9132-01	Cutter grease 0,4 kg tube

Re-greasing option

If it is not possible to re-grease the cutter through the centre hole as described on page 33, we recommend to re-grease the cutter through the seal retainer.

1

Disconnect the two conical plugs in the seal retainers. Mount a grease nipple in one of the holes.

2

Attach a grease pump and start pumping.

3

Continue to pump until grease comes out through the relief hole in the opposite seal retainer. Rotate the cutters ± 20 revolutions. Mount two new conical plugs in each seal retainer.

Seal replacement

1

Cut the four welding joints on the seal retainer. Use a small cutting disc. Remove protection ring 7008-9113.

2

Remove the snap ring 7008-9111. Use a hammer and a small chisel. Fill the cutter with grease before dismantling the seals to avoid dirt coming into the bearing system.

3

Make a puller tool by using two bolts, nuts and a small U-beam. Tack weld the two bolts to the retainer ring. Remove the retainer ring by tightening the nuts and tapping the retainer ring with a hammer. The retainer ring can be reused if it is not damaged.

4

Remove the two seal halves from both the retainer ring and the cutter shell. Remove the O-ring 7008-9112 from the journal.

5

Clean the snap ring groove, the O-ring groove and the seal seat carefully. Ensure that the seal seat is in good condition. If not, file the marks and nicks. Make sure no muck or dirt comes in to the bearing system.

6

Inspect the retainer pin 7008-9118. Replace if showing excessive wear.

7

Install the two seal halves (7008-9110) in both the retainer ring and the cutter shell. Important! Follow the mounting instructions from the seal manufacturer carefully. Instructions can be obtained from your local Sandvik representative.

8

Mount the O-ring 7008-9112. Mount the retainer ring carefully. E.g. use a hammer and clamp for smooth mounting. Mount the snap ring 7008-9111. Note! Always use a new O-ring and snap ring.

9

Mount the protection ring 7008-9113 and weld four joints 90° apart. Use MIG welding. Recommended welding wire Ø 1,2 mm OK AUT-ROD 12,51 or similar.

10

Re-grease the cutter according to the re-greasing instruction. This completes the seal change.

Spares to re-seal/ cutter

Pcs	Part No.	Item
2	7008-9110	Seal
2	7008-9101	Seal retainer
2	7008-9111	Snap ring
2	7008-9115	O-ring
1	7008-9113	Lock ring

Inspection report

Raise No.:	Date:	
Reaming head: CRH	Dia.:	mm
Reaming head No:		
Stem dia.:	mm	
Stem No.:		

Stem check list

Wear pad dia.:		mm
Wear pad OK:	Yes	No
Wrench flats OK:	Yes	No
Thread OK:	Yes	No
Bolt joints OK:	Yes	No
Stem OK for use in next raise:	Yes	No
Other:		

Saddle check list

Bolt joints OK:	Yes	No
OK for use in next raise:	Yes	No
Others:		
Sign:		

Cutter check list

Pos	Cutter		Re-grease		Seal change		Button	Total	Others
	Serial No.	Type	Yes	No	Yes	No	Life %	Meters	
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

Visual inspection – Cutter

Ref No: ..... Location: ..... Date: ..... Sign: .....

Pos	Cutter		Type of cutter service				Button life %	Number of metres / hours	Misc.
	Serial No.	Type	OK	Re.grease	Seal change	Open			
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									

Notes:

Visual inspection – Full area boring equipment

Ref No: ..... **Location:** ..... **Date:** ..... **Sign:** .....

Part No.	Serial No.	Recommended service

Notes:

Sandvik Mining and Construction Tools AB
SE-811 81 Sandviken, Sweden. Tel +46 26 26 20 00 Fax +46 26 26 23 00

HR-13121